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10/737,203	12/16/2003	Hoshang Subawalla	06413P USA	7086

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EXAMINER

WEBB, GREGORY E

ART UNIT	PAPER NUMBER
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1751

DATE MAILED: 09/27/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/737,203

Applicant(s)

SUBAWALLA ET AL.

Examiner

Gregory E. Webb

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 15 August 2005.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-38 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-38 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. _____.
 - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date 121603; 11805; 81505

- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____

DETAILED ACTION

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

(e) the invention was described in a patent granted on an application for patent by another filed in the United States before the invention thereof by the applicant for patent, or on an international application by another who has fulfilled the requirements of paragraphs (1), (2), and (4) of section 371(c) of this title before the invention thereof by the applicant for patent.

The changes made to 35 U.S.C. 102(e) by the American Inventors Protection Act of 1999 (AIPA) and the Intellectual Property and High Technology Technical Amendments Act of 2002 do not apply when the reference is a U.S. patent resulting directly or indirectly from an international application filed before November 29, 2000. Therefore, the prior art date of the reference is determined under 35 U.S.C. 102(e) prior to the amendment by the AIPA (pre-AIPA 35 U.S.C. 102(e)).

Claims 1-38 are rejected under 35 U.S.C. 102(e) as being anticipated by McDermott, Wayne Thomas (US20040144399).

Concerning the dense cleaning fluid, McDermott, Wayne Thomas teaches the following:

[0127] Since the internal volume of the vessel and the mass of carbon dioxide in the vessel remain essentially unchanged during the heating

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step, the average density of the captured carbon dioxide will remain essentially unchanged at 29.2 lb/ft.³ regardless of the temperature and pressure. In this example, heating the selected initial charge of carbon dioxide isochorically (at constant volume) at a fixed density of 29.2 lb/ft.³ will pass through the critical point at the critical temperature of 87.9.degree. F. and the critical pressure of 1,071 psia.

Additional heating will form a supercritical fluid at the desired temperature and pressure having a fixed density of 29.2 lb/ft.³.

Using a smaller initial quantity of liquid carbon dioxide in the vessel will result in a lower density supercritical fluid; conversely, using a greater initial quantity of liquid carbon dioxide in the vessel will result in a higher density supercritical fluid. Heating a higher density supercritical fluid to a given temperature will generate a higher pressure than heating a lower density supercritical fluid to the same temperature.

Concerning the acetylenic alcohol, McDermott, Wayne Thomas teaches in table II compositions containing the acetylenic alcohol (i.e. Surfynol, Dynol, etc.), supercritical CO₂, nitriles, amines, alkanolamines, and esters (see table II).

Concerning the co-solvent, preferred cosolvent and the claimed chelating agent, McDermott, Wayne Thomas teaches the following:

7. The method of claim 1 wherein the dense processing fluid comprises one or more processing agents selected from a group consisting of an

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acetylenic alcohol, an acetylenic diol, a dialkyl ester, hydrogen fluoride, hydrogen chloride, chlorine trifluoride, nitrogen trifluoride, hexafluoropropylene, hexafluorobutadiene, octafluorocyclobutane tetrafluorochloroethane, fluoroxytrifluoromethane (CF.sub.4O), bis(difluoroxy)methane (CF.sub.4O.sub.2), cyanuric fluoride (C.sub.3F.sub.3N.sub.3), oxalyl fluoride (C.sub.2F.sub.2O.sub.2), nitrosyl fluoride (FNO), carbonyl fluoride (CF.sub.2O), perfluoromethylamine (CF.sub.5N), an ester, an ether, an alcohol, a nitrile, a hydrated nitrile, a glycol, a monester glycol, a ketone, a fluorinated ketone, a tertiary amine, an alkanolamine, an amide, a carbonate, a carboxylic acid, an alkane diol, an alkane, a peroxide, a water, an urea, a haloalkane, a haloalkene, a beta-diketone, a carboxylic acid, an oxine, a tertiary amine, a tertiary diamine, a tertiary triamine, a nitrile, a beta-ketoimine, an ethylenediamine tetraacetic acid and derivatives thereof, a catechol, a choline-containing compound, a trifluoroacetic anhydride, an oxime, a dithiocarbamate, and combinations thereof.

Concerning the preferred dense fluid and the fluorinated dense fluid, McDermott, Wayne Thomas teaches the following:

4. The method of claim 1 wherein the dense fluid comprises one or more components selected from the group consisting of carbon dioxide, nitrogen, methane, oxygen, ozone, argon, hydrogen, helium, ammonia,

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nitrous oxide, hydrogen fluoride, hydrogen chloride, sulfur trioxide, sulfur hexafluoride, nitrogen trifluoride, monofluoromethane, difluoromethane, tetrafluoromethane, trifluoromethane, trifluoroethane, tetrafluoroethane, pentafluoroethane, perfluoropropane, pentafluoropropane, hexafluoroethane, hexafluoropropylene, hexafluorobutadiene, octafluorocyclobutane, and tetrafluorochloroethane.

Concerning the most preferred fluid, temperature and pressure conditions, McDermott, Wayne Thomas teaches the following:

[0123] Returning now to FIG. 4, carbon dioxide supply vessel 301 is connected via two-way flow line 339 to carbon dioxide liquefier 341 located above the carbon dioxide supply vessel 301. Heat exchanger 343, which may be a plate and fin or other type of heat exchanger such as heat exchanger 425 of FIG. 5, is used to cool the interior of liquefier 341. A cooling fluid is supplied via line 330 and may be, for example, cooling water at an ambient temperature of 70.degree. F., which will maintain the pressure in carbon dioxide supply vessel 301 at the corresponding carbon dioxide vapor pressure of 854 psia.

Concerning the claimed substrate, McDermott, Wayne Thomas teaches the following:

[0099] A wide variety of contamination-sensitive articles encountered in the fabrication of microelectronic devices and micro-electromechanical devices can be cleaned or processed using embodiments of the present invention. The term "processing" or "processed" as used herein means

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contacting an article with a dense fluid or a dense processing fluid to effect physical and/or chemical changes to the article. The term "article" as used herein means any article of manufacture that can be contacted with a dense fluid or a dense processing fluid. Such articles may include, for example, silicon or gallium arsenide wafers, reticles, photomasks, flat panel displays, internal surfaces of processing chambers, printed circuit boards, surface mounted assemblies, electronic assemblies, sensitive wafer processing system components, electro-optical, laser and spacecraft hardware, surface micro-machined systems, and other related articles subject to contamination during fabrication.(par#129)

Claims 1-25 are rejected under 35 U.S.C. 102(e) as being anticipated by Daly, Andrew T. (US20040068027).

Concerning the dense cleaning fluid, Daly, Andrew T. teaches the following:

[0009] In a fourth aspect of the present invention, a method of making a low particle size pD powder to give a smooth, low gloss UV cured finish comprises one or more of the group consisting of forming an emulsion of a powder composition according to the present invention, followed by spray drying said emulsion; extruding a powder composition in a supercritical fluid to form a supercritical suspension, followed by spray drying said supercritical suspension; extruding a powder composition in a

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supercritical fluid in the presence of a cosolvent to form a supercritical suspension, followed by spray drying said supercritical suspension; extruding a powder composition to form an extrudate, followed by jet milling the extrudate; and combinations thereof. Preferably, a powder composition is extruded in supercritical fluid, with or without a cosolvent, to form a supercritical suspension, followed by spray drying said supercritical suspension.

Concerning the acetylenic alcohol, Daly, Andrew T. teaches the following:

[0040] The amount of fillers and/or pigments may be varied depending upon the desired film opacity and coloration of the resultant coating. In general, effective quantities of fillers and/or pigments may range from 0 to 120 phr, preferably from 1 to 90 phr, more preferably from 1 to 30 phr. In a preferred embodiment, the low gloss powder coatings are clear to translucent and contain an accordingly low proportion of pigment, e.g. from 0 to 60 phr, or they contain a clear to translucent filler, pigment or colorant in the amount of 0 to 120 phr. Suitable flow control agents include, for example, acrylic resins, silicone resins, combinations comprising at least one of the foregoing flow control agents, and the like. A suitable flow control agent for use in the present invention is RESIFLOW.RTM. P-67, an acrylate flow modifier, from Estron, Calvert city, KY. Suitable dry flow additives include, for example, fumed silica, alumina oxide, and the like, or combinations comprising at least one of

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the foregoing dry flow additives. Suitable anticratering agents include, for example, benzoin, benzoin derivatives, low molecular weight phenoxy and phthalate plasticizers, and the like, or combinations comprising at least one of the foregoing anticratering agents. Suitable surfactants include, for example, acetylenic diol, and the like. Suitable light stabilizers include, for example, hindered amines, hindered phenols, or combinations comprising at least one of the foregoing light stabilizers. In general, effective quantities of flow control additives, dry flow additives, anticratering agents, texturing agents, surfactants, or light stabilizers are individually from 0.1 to 15 phr, preferably from 0.5 to 5 phr.

Concerning the co-solvent, Daly, Andrew T. teaches the following:

[0051] Cosolvents may be combined with SC fluids. Such cosolvents may help to fully dissolve some components of a powder mixture in an extruder, gear pump or melt pump, static mixer, homogenizer or spray nozzle. A suitable cosolvent is any solvent or mixture of solvents which is miscible with the SC fluid and is a good solvent for a component of a powder composition. Suitable cosolvents may include tetrahydrofuran, ketones such as acetone, methyl ethyl ketone, methyl iso butyl ketone, cyclohexanone and other aliphatic ketones; esters such as methyl acetate, ethyl acetate, alkyl carboxylic esters; ethers such as methyl t-butyl ether, dibutyl ether, methyl phenyl ether, and other aliphatic or alkyl

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aromatic ethers; glycol ethers such as ethoxyethanol, butoxyethanol, propoxyethanol, butoxypropanol and other glycol ethers; glycol ether esters such as butoxyethoxy acetate, ethyl ethoxy propionate and other glycol ether esters; alcohols such as methanol, ethanol, propanol, 2-propanol, butanol, amyl alcohol and other aliphatic alcohols; and aromatic hydrocarbons such as toluene, xylene and other aromatics or mixtures of aromatic solvents; and nitro alkanes such as 2-nitro propane. Cosolvents may be added anywhere where SC fluid is present and may be added in the amount of from 0 to 50 weight %, preferably from 0 to 15 weight %, based on the total weight of the resulting supercritical suspension of powder.

Concerning the claimed chelating agent, Daly, Andrew T. teaches the following:

[0022] Suitable aromatic or saturated di- or polycarboxylic acids (or their anhydrides) include, for example, adipic acid, succinic acid, sebacic acid, malonic acid, glutaric acid, cyclohexane dicarboxylic acid, dodecane dicarboxylic acid, phthalic anhydride, isophthalic acid, terephthalic acid, tetrahydrophthalic acid, hexahydrophthalic acid, trimellitic acid, pyromellitic anhydride, and the like.(par#36)

Concerning the preferred dense fluid, most preferred fluid and the fluorinated dense fluid, Daly, Andrew T. teaches the following:

[0050] SC fluids suitable for use in the present invention may comprise carbon dioxide, ammonia, N.sub.2O, methane, ethane, ethylene, propane,

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chlorotrifluoromethane, trifluoroethane, trifluoropropane and monofluoromethane. Preferably, SC fluid comprises carbon dioxide or propane. SC fluids may be used in the total amount of from 5 to 90 weight %, preferably from 20 to 80 weight % based on the total weight of resulting supercritical suspension. In supercritical extrusion, for example, SC fluid may preferably be used in the amount of from about 5 to 60 weight %, based on the weight of the resulting supercritical suspension, and the remainder of the SC fluid is then charged to one or more than one apparatus located downstream of the extruder. In supercritical spray drying, all of the SC fluid used in processing may be charged to the spray nozzle.

Claims 1-25 are rejected under 35 U.S.C. 102(e) as being anticipated by Bijl, Dirk Johannes (US20010023237).

Concerning the dense cleaning fluid and the most preferred fluid, Bijl, Dirk Johannes teaches the following:

[0025] "Supercritical fluid carbon dioxide" means carbon dioxide which is at or above the critical temperature of 31.degree. C. and the critical pressure of 7.2 Mpa (71 atmospheres) and which cannot be condensed into a liquid phase despite the addition of further pressure. The term "densified carbon dioxide" encompasses both liquid and supercritical fluid carbon dioxide.

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Concerning the acetylenic alcohol, Bijl, Dirk Johannes teaches the use of acetylenic diols and in example 4 demonstrates their use in a supercritical composition (see table 4).

Concerning the co-solvent, Bijl, Dirk Johannes teaches the following:

[0050] Such groups preferably include ester, keto, ether, amide, amine, thio, alkyl, alkenyl, fluoroalkyl, fluoroalkenyl and mixtures thereof.

Concerning the preferred cosolvent, Bijl, Dirk Johannes teaches the following:

[0112] The inventive bleach composition also comprises a bleach-compatible solvent. The type of solvent will depend on the exact nature of the bleaching agent. If the bleaching agent is more or less hydrophobic then a hydrophobic fluid may be preferred. Alternatively if the organic substance is more or less hydrophilic, a hydrophilic fluid may be preferred. In many cases it will be preferable, to dissolve or to disperse bleaching agent in an aqueous solvent such as water. Preferred amounts of bleach-compatible solvent should be from 0.0001 to about 10 wt % (weight/weight of the carbon dioxide), more preferably 0.001 to about 5 wt %, even more preferably 0.01 to about 3 wt %, most preferably from about 0.05 to about 0.2 wt %. Preferred solvents include water, ethanol, acetone, hexane, methanol, glycols, acetonitrile, C.sub.1-10 alcohols and C.sub.5-15 hydrocarbons. Especially preferred solvents include water, ethanol and methanol.

Concerning the preferred dense fluid and the fluorinated dense fluid, Bijl, Dirk Johannes teaches the following:

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[0125] It is noted that other densified molecules having supercritical properties may also be employed alone or in mixture. These molecules include methane, ethane, propane, ammonia, butane, n-pentane, n-hexane, cyclohexane, n-heptane, ethylene, propylene, methanol, ethanol, isopropanol, benzene, toluene, p-xylene, sulfur dioxide, chlorotrifluoromethane, xenon trichlorofluoromethane, perfluoropropane, chlorodifluoromethane, sulfur hexafluoride and nitrous oxide.(par#128)

Claims 1-38 are rejected under 35 U.S.C. 102(e) as being anticipated by McDermott, Wayne Thomas (US20040055621).

Concerning the dense cleaning fluid, McDermott, Wayne Thomas teaches the following:

[0117] Since the internal volume of the vessel and the mass of carbon dioxide in the vessel remain essentially unchanged during the heating step, the average density of the captured carbon dioxide will remain essentially unchanged at 29.2 lb/ft.³ regardless of the temperature and pressure. In this example, heating the selected initial charge of carbon dioxide isochorically (at constant volume) at a fixed density of 29.2 lb/ft.³ will pass through the critical point at the critical temperature of 87.9.degree. F. and the critical pressure of 1,071 psia. Additional heating will form a supercritical fluid at the desired temperature and pressure having a fixed density of 29.2 lb/ft.³.

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Using a smaller initial quantity of liquid carbon dioxide in the vessel will result in a lower density supercritical fluid; conversely, using a greater initial quantity of liquid carbon dioxide in the vessel will result in a higher density supercritical fluid. Heating a higher density supercritical fluid to a given temperature will generate a higher pressure than heating a lower density supercritical fluid to the same temperature.

Concerning the acetylenic alcohol, co-solvent and the claimed chelating agent, McDermott, Wayne Thomas teaches the following:

[0140] The exemplary process described above with reference to FIG. 3 may utilize one or more entrainers mixed with a dense fluid to provide a dense film stripping or cleaning fluid containing 0.1 to 20 wt % entrainer. An entrainer is defined as a processing agent that enhances the cleaning ability of the dense fluid to remove contaminants from a contaminated article. Entrainers generally may include solvents, surfactants, chelators and chemical modifiers. Some examples of representative entrainers include acetylenic alcohols and diols, organosilicones, ethyl acetate, ethyl lactate, propyl acetate, butyl acetate, diethyl ether, dipropyl ether, methanol, ethanol, isopropanol, acetonitrile, propionitrile, benzonitrile, ethylene cyanohydrin, ethylene glycol, propylene glycol, ethylene glycol monoacetate, propylene glycol monoacetate, acetone, butanone, acetophenone, trifluoroacetophenone,

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triethyl amine, tripropyl amine, tributyl amine, 2,4, dimethyl pyridine, dimethylethanolamine, diethylethanolamine, diethylmethanolamine, dimethylmethanolamine, dimethylformamide, dimethylacetamide, ethylene carbonate, propylene carbonate, acetic acid, lactic acid, butane-diol, propane-diol, n-hexane, n-butane, hydrogen peroxide, t-butyl hydroperoxide, and chelating agents such as ethylenediaminetetraacetic acid (EDTA), catechol, choline, beta-diketone and beta-ketoimine ligands, trifluoroacetic anhydride (TFM), halogenated carboxylic acids, halogenated glycols, and halogenated alkanes.

Concerning the preferred cosolvent, McDermott, Wayne Thomas teaches the following:

7. The method of claim 1 wherein the dense processing fluid comprises one or more processing agents selected from the group consisting of ethyl acetate, ethyl lactate, propyl acetate, butyl acetate, diethyl ether, dipropyl ether, methanol, ethanol, isopropanol, acetonitrile, propionitrile, benzonitrile, ethylene cyanohydrin, ethylene glycol, propylene glycol, ethylene glycol monoacetate, propylene glycol monoacetate, acetone, butanone, acetophenone, trifluoroacetophenone, triethyl amine, tripropyl amine, tributyl amine, 2,4, dimethyl pyridine, dimethylethanolamine, diethylethanolamine, diethylmethanolamine, dimethylmethanolamine, dimethylformamide, dimethylacetamide, ethylene carbonate, propylene carbonate, acetic acid, lactic acid, butane-diol, propane-diol, n-hexane, n-butane, hydrogen peroxide, t-butyl

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hydroperoxide, ethylenediaminetetraacetic acid, catechol, choline, and trifluoroacetic anhydride.

Concerning the preferred dense fluid and the fluorinated dense fluid, McDermott, Wayne Thomas teaches the following:

4. The method of claim 1 wherein the dense fluid comprises one or more components selected from the group consisting of carbon dioxide, nitrogen, methane, oxygen, ozone, argon, hydrogen, helium, ammonia, nitrous oxide, hydrogen fluoride, hydrogen chloride, sulfur trioxide, sulfur hexafluoride, nitrogen trifluoride, monofluoromethane, difluoromethane, trifluoromethane, trifluoroethane, tetrafluoroethane, pentafluoroethane, perfluoropropane, pentafluoropropane, hexafluoroethane, hexafluoropropylene, hexafluorobutadiene, and octafluorocyclobutane and tetrafluorochloroethane.

Concerning the most preferred fluid, McDermott, Wayne Thomas teaches the following:

[0113] Returning now to FIG. 3, carbon dioxide supply vessel 301 is connected via two-way flow line 339 to carbon dioxide liquefier 341 located above the carbon dioxide supply vessel 301. Heat exchanger 343, which may be a plate and fin or other type of heat exchanger such as heat exchanger 425 of FIG. 4, is used to cool the interior of liquefier 341. A cooling fluid is supplied via line 330 and may be, for example, cooling water at an ambient temperature of 70.degree. F., which will maintain the pressure in carbon dioxide supply vessel 301 at the corresponding carbon

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dioxide vapor pressure of 854 psia.

Concerning the claimed substrate, McDermott, Wayne Thomas teaches the following:

[0108] The term "processing" or "processed" as used herein means contacting an article with a dense fluid or a dense processing fluid to effect physical and/or chemical changes to the article. The term "article" as used herein means any article of manufacture which can be contacted with a dense fluid or a dense processing fluid. Representative articles may include, for example, silicon or gallium arsenide wafers; reticles; photomasks; flat panel displays; internal surfaces of processing chambers; printed circuit boards; surface mounted assemblies; electronic assemblies; sensitive wafer processing system components; electro-optical, laser and spacecraft hardware; surface micro-machined systems; and other related articles subject to contamination during fabrication. The term "processing" may include, for example, film stripping, cleaning, drying, etching, planarization, deposition, extraction, photoresist development, or formation of suspended nano-particles and nano-crystals.

Claims 1-38 are rejected under 35 U.S.C. 102(e) as being anticipated by McDermott, Wayne Thomas (US20040055624).

Concerning the dense cleaning fluid, McDermott, Wayne Thomas teaches the following:

[0067] Supercritical fluids are ideal for these applications because these

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fluids characteristically have high solvent power, low viscosity, high diffusivity, and negligible surface tension relative to the articles being processed. As pointed out above, the supercritical fluids used in microelectronic processing must have extremely high purity, much higher than that of supercritical fluids used in other applications. The generation of extremely high purity supercritical fluids for these applications must be done with great care, preferably using the methods described herein.

Concerning the acetylenic alcohol, co-solvent and the claimed chelating agent, McDermott, Wayne Thomas teaches the following:

[0024] The one or more processing agents may be selected from the group consisting of acetylenic alcohols, acetylenic diols, non-ionic alkoxyated acetylenic diol surfactants, non-ionic self-emulsifiable acetylenic diol surfactants, siloxane polymers, silicone-based surfactants, tertiary alkyl amines, quaternary alkyl amines, tertiary di-amines, quaternary di-amines, amides, dimethyl formamide, dimethyl acetamide, alkyl alkanolamines, dimethanolethylamine, beta-diketone ligands, beta-ketoimine ligands, trifluoroacetic anhydride, halogenated carboxylic acids, halogenated glycols, halogenated alkanes, and halogenated ketones.

Concerning the preferred dense fluid and the fluorinated dense fluid, McDermott, Wayne Thomas teaches the following:

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[0015] The dense fluid may comprise one or more components selected from the group consisting of carbon dioxide, nitrogen, methane, oxygen, ozone, argon, hydrogen, helium, ammonia, nitrous oxide, hydrocarbons having 2 to 6 carbon atoms, hydrogen fluoride, hydrogen chloride, sulfur trioxide, fluoroform, sulfur hexafluoride, nitrogen trifluoride, monofluoromethane, difluoromethane, trifluoromethane, trifluoroethane, tetrafluoroethane, pentafluoroethane, perfluoropropane, pentafluoropropane, hexafluoroethane, and tetrafluorochloroethane.

Concerning the most preferred fluid, McDermott, Wayne Thomas teaches the following:

[0076] The invention can be illustrated by the generation and use of a dense processing fluid for use in the cleaning of an article such as a microelectronic component. An exemplary process for this application is shown in FIG. 3, which illustrates an isochoric (constant volume) carbon dioxide pressurization system to generate a carbon dioxide dense fluid for an electronic component cleaning chamber or processing tool, and includes a carbon dioxide recovery system to recycle carbon dioxide after separation of extracted contaminants. Liquid carbon dioxide and its equilibrium vapor are stored in carbon dioxide supply vessel 301, typically at ambient temperature; at 70.degree. F., for example, the vapor pressure of carbon dioxide is 854 psia. At least one carbon dioxide pressurization vessel is located downstream of the supply vessel 301. In this embodiment, three pressurization vessels 303, 305, and 309

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(described in more detail below) are shown in flow communication with carbon dioxide supply vessel 1 via manifold 311 and lines 313, 315, and 317 respectively. These lines are fitted with valves 319, 321, and 323, respectively, to control flow of carbon dioxide from supply vessel 301 to the pressurization vessels. Fluid supply lines 325, 327, and 329 are connected to manifold 331 via valves 333, 335, and 337 respectively.

Concerning the claimed substrate, McDermott, Wayne Thomas teaches the following:

[0104] The term "processing" as used herein means contacting an article with a dense processing fluid to effect physical and/or chemical changes to the article. The term "article" as used herein means any article of manufacture which can be contacted with a dense processing fluid.

Representative articles may include, for example, silicon or gallium arsenide wafers, reticles, photomasks, flat panel displays, internal surfaces of processing chambers, printed circuit boards, surface mounted assemblies, electronic assemblies, sensitive wafer processing system components, electro-optical, laser and spacecraft hardware, surface micro-machined systems, and other related articles subject to contamination during fabrication.

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Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Gregory E. Webb whose telephone number is 571-272-1325. The examiner can normally be reached on 9:00-17:30 (m-f).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Yogendra Gupta can be reached on 571-272-1316. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).



Gregory E. Webb
Primary Examiner
Art Unit 1751

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